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TECHNICAL MEMORANDUM

Date: April 18, 2022

To: Mr. John Krause
Regional Environmental Scientist
BIA Western Regional Office, Division of Environmental and Cultural Resources

From: Brian Pletcher, RG – Project Manager
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Subject: **Data Gap Environmental Investigation Recommendations**
BIA Contract A16PX00431—Duck Valley Indian Reservation, Owyhee, Nevada
Akana Project 16-005

This technical memorandum presents recommended tasks to collect additional field and data analysis activities for the Duck Valley Indian Reservation (DVIR) hydrocarbon assessment project located in Owyhee, Nevada. The data collected will be used to finalize the feasibility study and remediation work plan. Summaries of site information and previous site activities are provided for completeness and convenience.

SITE DESCRIPTION

The DVIR is north of Elko, Nevada, and located on the Idaho-Nevada border on Nevada State Highway 225, which turns into Idaho State Highway 51 at the Idaho-Nevada state line. The town of Owyhee is approximately at an elevation 5,400 feet above mean sea level (amsl). The land to the east rises sharply to approximately 6,700 feet amsl. Duck Valley is on the Snake River Drainage, just north of the Great Basin. Irrigation water is controlled by the Wild Horse Dam, located approximately 30 miles upstream (to the southwest), on the Owyhee River.

Groundwater occurs in a shallow alluvial aquifer. The depth to groundwater recorded in monitoring wells between 2005 and 2009 ranged from approximately 3 feet to 14 feet below ground surface (bgs). The direction of groundwater flow in the central area of Owyhee, south of OPD Road,

historically has been to the northwest at a gradient of approximately 0.006 feet per foot (ft/ft). A trough-like feature in the potentiometric surface, with a northwest-southeast trend, has been observed in this area. The direction of groundwater flow in the vicinity of the former Indian Health Services (IHS) facility has historically been to the west; however, the hydraulic gradient is steeper in this area (0.05 ft/ft).

RELEASE HISTORY

In February 1985, 8,000 gallons of heating oil were delivered to a 16,000-gallon above-ground storage tank (AST), located approximately 75 feet east of Highway 225, near an old power plant. Five days later, and before the 8,000 gallons should have been consumed, the tank was empty, suggesting that the pipelines that carried fuel to consumers had substantial leaks. Use of the heating oil pipeline was discontinued in 1985, and the 16,000-gallon AST continued to be used to store fuel, which was transferred by truck to individual ASTs.

In October 1987, an oil-like odor was discovered in two municipal wells, which were subsequently taken out of service. In March 1998, the IHS reported that the Owyhee public water contained a petroleum-like taste. The Tribe excavated nine test pits to depths of 12 to 15 feet bgs to the east, west, and north of the Tribal Maintenance Building. Free-phase hydrocarbons (FPH) were observed on the groundwater surface in two test pits north of the Tribal Maintenance Building, between municipal supply Wells #1 and #3. Soil was excavated along the buried pipeline north of the Tribal Maintenance Building to groundwater, and FPH were encountered beneath pipeline fittings. Soil samples obtained from underneath the pipeline contained concentrations of total petroleum hydrocarbons in the diesel range (TPHd) from 11,000 to 12,000 milligrams per kilogram (mg/kg).

In March 1988, a 12,000-gallon underground storage tank (UST) located on the east side of the Road Shop building and a 12,000-gallon UST located south of the former power plant (east of the highway) were removed. Both USTs were used for storing diesel, and neither UST was connected to the town site distribution pipeline.

No hydrocarbon-impacted soil was reported from either excavation, and no soil test data were available from this activity. Sometime during 1989, a 1,000-gallon AST containing gasoline at the northeast comer of the Road Shop yard was vandalized. It was estimated that 200 to 800 gallons of gasoline were released to the ground surface.

During the installation of a water line in November 1995, approximately sixty feet of pipeline was removed northeast of the Tribal Maintenance Building, near the intersection of "L" and "C" Streets. Soils in the vicinity of the line were reported to be impacted with heating oil.

PREVIOUS INVESTIGATIONS AND CORRECTIVE ACTIONS

During 1995 and 1996, the BIA contracted the removal of approximately sixty feet of heating oil distribution pipeline northeast of the Tribal Maintenance Building, near the intersection of BIA Road and Gah-Nee Road. During the removal, soil within the excavation pit was observed to be hydrocarbon-impacted along the entire length of the line. BIA plugged and abandoned the injection well; removed and disposed of several leaking drums containing used motor oil, road sealant, and herbicides (2,4-D, 2,4,5-T, and Dinoseb) from the Roads Yard; and excavated approximately 40 cubic yards of Dinoseb-impacted soil to a depth of seven feet bgs.

In 1999, Cherokee General Corporation and SECOR removed most of the remaining heating oil pipeline and significant quantities of hydrocarbon-impacted soils, where feasible. SECOR also conducted a subsurface investigation to estimate the remaining impact to soil and groundwater and characterized the hydrogeology of the site. The results from the investigation suggested that six releases of petroleum had occurred at the following locations:

Major releases

1. Along the heating oil pipeline east of Highway 225
2. At a former heating oil UST, 200 feet west of Highway 225
3. At a 90-degree tum in the pipeline, 475 feet west of Highway 225 at the intersection of "L" Street and “C" Street
4. Along the pipeline near the ASTs in the northeast corner of the Tribal Maintenance Yard

Moderate releases

5. At a former UST location in the northern area of town near the jail
6. At the discharge pipe outlet in the BIA Road Shop Yard

Of these releases, four (locations 2 through 5) appeared to have impacted groundwater in the release and northwest of the release. Evidence of groundwater impact in these four areas consisted mainly of TPHd, although groundwater downgradient from the Tribal Maintenance Yard release (location 4) contained both TPHd and total petroleum hydrocarbons in the gasoline range (TPHg). Groundwater was not encountered during excavation in location 1, and the rocky subsurface prohibited water sample collection; it is therefore not known whether groundwater in this area was impacted. Groundwater samples collected in the area surrounding the discharge pipe outlet (location 6) indicate that groundwater was not impacted.

Numerous other areas where petroleum releases occurred along the pipeline and at former storage tank locations were investigated by SECOR in 1999 and mitigated through soil removal. Relatively shallow subsurface soils that were impacted with petroleum products by past activities (e.g., equipment storage) at the Road Shop area were also excavated and removed. In total, approximately 2,850 cubic yards (yd^3) of impacted soil were removed from throughout the site. Of the nearly 30 areas excavated during this investigation, TPH-impacted soil was left in 18 areas, because the location of buildings, structures, roads, or utilities prevented further excavation or the amount of clean soils overlying impacted areas made the removal of the soils cost prohibitive.

In the fall of 2000, Steffen, Robertson & Kirsten Consultants (SRK) advanced and sampled 21 soil borings, 18 of which were converted to groundwater monitoring wells. The analytical data from samples collected during the installation of the wells provided further evidence that soils and groundwater in the areas delineated in 1999 were impacted with TPH. During the November 2000 sampling event, groundwater samples from the wells were analyzed for TPHg, volatile organic compounds (VOC), semi-volatile organic compounds (SVOC) and the eight metals identified by the Resource Conservation and Recovery Act (RCRA) as hazardous (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). The VOC and SVOC analyses provided an indication of the concentration of degraded TPHd components and solvent constituents in the groundwater but did not provide TPHd concentrations. No metal concentrations were detected in the groundwater samples and VOC concentrations reported were below the federal primary drinking water standards. Samples from well MW-5 were also analyzed for pesticides and herbicides because of reported historic improper disposal of these compounds in the vicinity of the well. No pesticides or herbicides were detected in the samples.

SRK also provided oversight for the removal of two USTs and one AST from the former IHS Hospital site during their investigation. Only non-native backfill soils were removed from the UST basin, and soil samples collected from native soils in the excavation had TPHd concentrations ranging from 560 mg/kg to 6,100 mg/kg. Three monitoring wells were installed in the vicinity of the hospital (MW-16, -17, and - 18). Low concentrations of naphthalene, a degradation product of TPHd, were detected in each of the three wells.

In 2002, the BIA contracted Western Construction Incorporated (Western) to begin grading and paving roads throughout Duck Valley. While the roads were under construction, SECOR supervised Western during the excavation of TPH-impacted soils from beneath the roads where impacted soils had been left during the 1999 investigation. During this investigation, approximately 1,932 yd^3 of TPH-impacted soil were excavated from beneath roads. The total volume of soils excavated was 1,348 yds^3 from the area near the intersection of '"L" Street and" C" Street; 560 yd^3 from the area along the pipeline near the ASTs in the northeast comer of the Tribal Maintenance Yard; and 24 yd^3 from approximately 50 feet west of Highway 51 along the northern edge of "D" Street.

SECOR personnel monitored and sampled 17 monitoring wells for four quarters between September 2004 and June 2005. The June 2005 analytical data indicated that groundwater in the area encompassing wells MW-6, MW-8, MW-11, and MW-13 continued to have TPHg concentrations ranging from 0.54 to 2.0 milligrams per liter (mg/L) and TPHd concentrations from 1.3 to 67 mg/L. Trichloroethylene (TCE) was first detected in monitoring well MW-10 during the September 2002 sampling event. The observed TCE concentration has remained relatively stable, ranging from 1.2 to l .6 micrograms per liter over the entire period of groundwater monitoring.

SECOR estimated the extent of TPH-impacted soil that had not been excavated during the 1999 and 2002 excavations. TPH-impacted soil remains in the in the following areas:

- Between "L" and "N" Streets
- In the area of wells MW-13 and MW-16 along utility corridors
- Beyond the street rights-of-way
- Throughout the soil/water interface (capillary fringe)

Soil in the vicinity of well MW-10 on the east and west sides of Highway 225 is impacted with TPHd.

Based on final groundwater sampling event, SECOR recommended that groundwater sampling be continued, and additional soil borings and monitoring wells be installed to further the delineate the extent of the TPH impacts to soil and groundwater. In addition, SECOR reported that, due to a lack of remedial action levels at the site, it was not possible to make recommendations regarding the extent of Dinoseb contamination in groundwater.

During August and September 2008, BIA subsequently contracted with Stantec (formerly SECOR) to abandon five monitoring wells (MW-4, MW-5, MW-16, MW-17, and MW-18), and three municipal wells (Well #1, Well #2, and Well #3), to install 13 monitoring wells (MW-SR, and MW-19 through MW-30), and to monitor new and existing wells for a period of one year. Samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (collectively referred to as BTEX), TPHg, TPHd, and naphthalene. Additionally, the sample collected from well MW-10 was analyzed for TCE.

Stantec's 2009 Summary Report recommended that remedial objectives for the site be established, including threshold remedial action goals for criteria contaminants, followed by the development and implementation of a Remedial Work Plan and continued monitoring to evaluate the effectiveness of remedial activities.

In April 2013, BIA contracted Dougherty Sprague Environmental (DSE) to perform the latest groundwater monitoring event, sampling and analyzing groundwater from each of the existing

monitoring wells. DSE collected samples from 23 monitoring wells and reported that areas of groundwater contamination were relatively localized (TPHd being the exception), and that only benzene was detected above the Regional Screening Level (RSL) in monitor well MW-24. TCE was not detected in any of the samples. Each sample was analyzed for BTEX, TCE, Dinoseb, gasoline and diesel range organics.

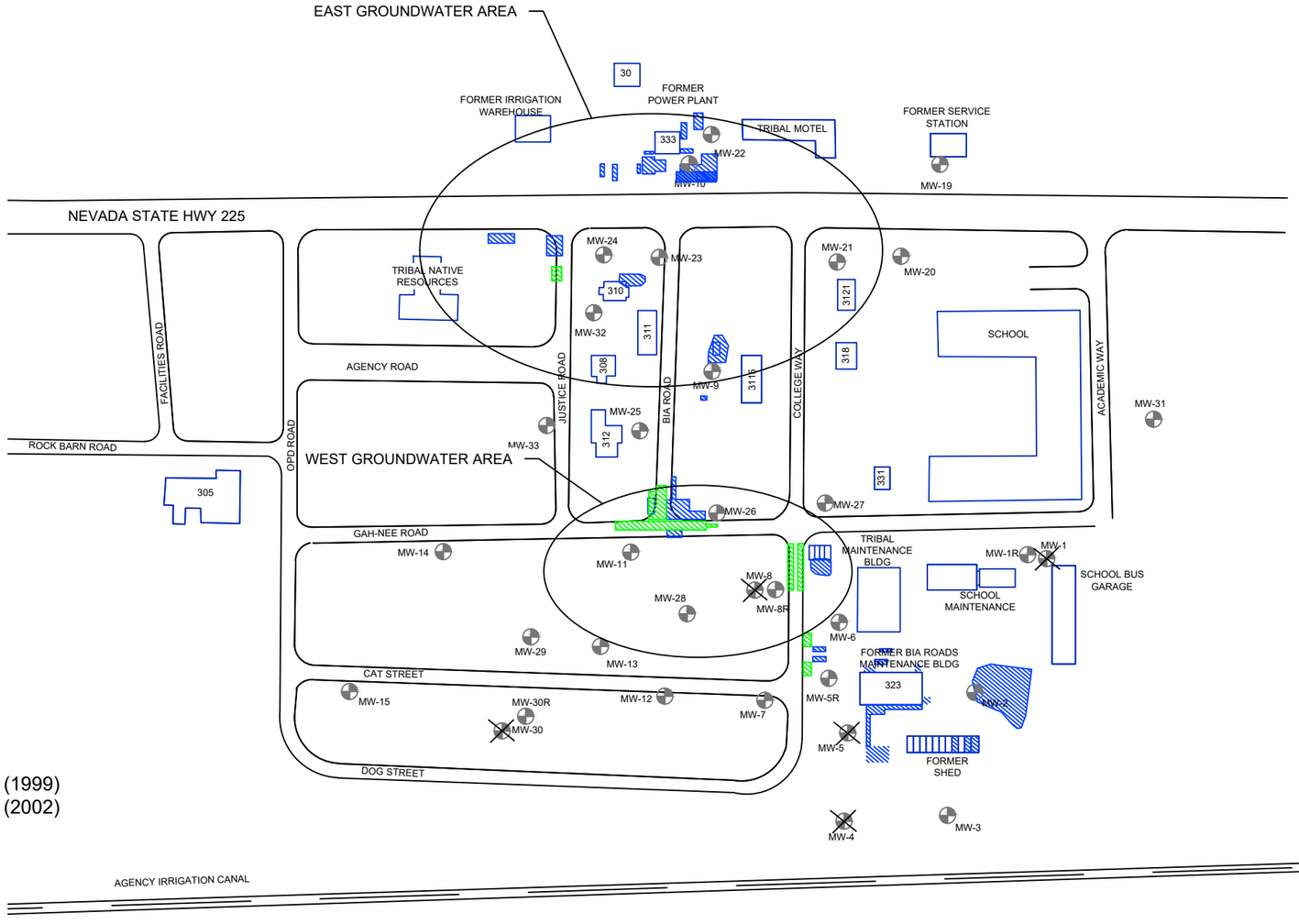
Akana recently completed a Groundwater Assessment Report to summarize the recent delineation of the extent of petroleum hydrocarbon impacts to shallow groundwater at the site. The report findings indicate that groundwater containing petroleum hydrocarbons at concentrations exceeding the U.S. Environmental Protection Agency (EPA) health-based standards continues to persist beneath two areas at the site—the East and West Groundwater Areas. In these areas, residual concentrations of petroleum hydrocarbons in subsurface soil within the vadose and groundwater fluctuation zones continue to dissolve in groundwater. The East and West Groundwater Areas are shown on the Figure 1.

The report findings further indicate that the extent of the impacted groundwater in these areas is stable, and the hydrocarbon concentrations have plateaued. Due to leveling out of groundwater concentrations, a remediation strategy solely relying on natural attenuation of petroleum hydrocarbons will require many years to reduce the groundwater concentrations to levels less than the EPA standards. During this time, the Tribe will need to issue restrictive covenants and ordinances to limit land and groundwater uses within the two groundwater areas.

Several other alternatives in addition to natural attenuation, are being evaluated as part of Akana's current feasibility evaluation of remedial alternatives. Several data gaps have been identified that need to be addressed before a final remedy, or combination of remedies, is selected for implementation. The objective of the draft scope of work is to describe the activities to obtain the needed data and information, estimated budget, and completion timeline.

FIGURE 1

MAP OF HISTORIC RELEASE AREAS



GRAPHIC SCALE

100 0 100 200

(IN FEET)

LEGEND

- EXISTING MONITORING WELL
- DECOMMISSIONED MONITOR WELL
- AREAS OF HISTORICAL EXCAVATION (1999)
- AREAS OF HISTORICAL EXCAVATION (2002)

SOURCE: This is a reproduction of information gathered from Stantec. December 16, 2009. Summary Report, Well Installation, Abandonment and Monitoring Activities, October 2007 to May 2009. Bureau of Indian Affairs, Duck Valley Indian Reservation, Owyhee, Nevada.

BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET ADJUST SCALES ACCORDINGLY

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PROPOSAL

DUCK VALLEY INDIAN RESERVATION, NV

EAST AND WEST GROUNDWATER AREAS

16-005

FIG. 1

ENCLOSURE 1

PROPOSED SCOPE OF WORK

(4 Pages)

PROPOSED SCOPE OF WORK

The proposed scope of work includes the following tasks.

Task 1—Complete a Work Plan of Investigations

A work plan will be prepared for the U.S. Bureau of Indian Affairs (BIA) review and comment. The plan will include a detailed description of the field work, data to be collected, collection methods, and data analysis. An updated Health and Safety Plan will be included with the plan.

Task 2—Complete Subsurface Soil Sampling

Sampling of subsurface soils will be conducted in two areas of the site—the East and West Groundwater Areas—where groundwater exhibiting concentrations of petroleum hydrocarbons greater than U.S. Environmental Protection Agency (EPA) standards appear to be in contact with impacted subsurface soils. The groundwater areas are shown on the attached figure.

In the East Groundwater Area, subsurface soils will be investigated in the area adjacent to the Former Power Plant Building 333; in the 1999 excavations east of Hwy 225; and around MW-24 and BIA Building 310, where soil samples L15 and L16 were collected in 1999. In the West Groundwater Area, subsurface soils in the areas of the 2002 excavations L7 and L34 and between wells MW-8A, MW-11, and MW-26 will be investigated.

The collected samples will be submitted to an accredited laboratory for the following analyses:

- Volatile organic compounds (VOC) by Method 8015D/GRO
- Semi-volatile organic compounds (SVOC) by Method 3511/8015
- VOCs by Method 8260D
- SVOCs by Method 8270E

The investigation-derived waste (IDW) from drilling will be stored in 55-gallon steel drums for disposal, as described in Task 6.

Task 3—Install Additional Monitoring Wells

Additional groundwater definition is needed in two locations within the East Groundwater Area. Based on existing groundwater data, the extent of impacted groundwater downgradient of well MW-24 is not adequately delineated. Furthermore, the presence and extent of TPHd impacts to groundwater downgradient of the former L29 excavation and Building 333 is not well defined.

The drilling IDWs will be stored in 55-gallon steel drums for disposal, as described in Task 6.

Task 4—Complete Soil Gas Surveys

The site groundwater data indicate that petroleum hydrocarbons are present in shallow groundwater in the East and West Areas at levels exceeding the EPA screening level concentrations for the vapor intrusion exposure pathway. To investigate whether this pathway is complete, samples of soil gas will be collected.

The samples will be collected following the protocols described in EPA's Office of Solid Waste and Emergency Response *Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air*. The collected soil gas samples will be sent to the laboratory for the following analyses:

- VOCs and TPH-GRO by Method TO-15
- SVOCs and TPH-DRO by Method TO-13

Task 5—Complete Groundwater Monitoring and Sampling

The last groundwater sampling of the monitoring wells at the site was completed in December 2019. This task includes monitoring and sampling 11 wells, including seven existing wells MW-6, MW-8R, MW-11, MW-13, MW-23, MW24, and MW-28, and four proposed new wells. Thirteen samples (eleven samples, one duplicate, and one trip blank) will be analyzed for the same constituents as in the previous quarterly sampling events:

- VOCs by Method 8015D/GRO
- SVOCs by Method 3511/8015
- VOCs by Method 8260D
- SVOCs by Method 8270E

The sampling purge waters will be stored in 55-gallon steel drums for disposal, as described in Task 6.

Task 6—IDW Disposal

The IDW will consist of used personal protective equipment (PPE), such as nitrile gloves, potentially impacted soil, equipment decontamination water, and groundwater. PPE will be placed in black plastic bags and properly disposed. Soil and decontamination water IDW will be containerized in Department of Transportation approved 55-gallon steel drums. IDW will be disposed of at an EPA-approved and permitted RCRA treatment, storage, and disposal facility.

Task 7—Evaluate Buildings Above Impacted Subsurface Soils

As described above, the data and information from past excavations and soil removal actions indicate that petroleum hydrocarbons remain in subsurface soils beneath Buildings 310 and 333 in the East Groundwater Area, and surrounding excavations L7 and L34 in the West Area. This task includes conducting the following evaluations in preparation for potential soil removal actions in these areas:

- Inspect the exterior and interior of Building 333 and determine the dimensions, utilities, building materials, current usage, and other planning relevant to its potential future demolition and removal
- Inspect Building 310 determine dimensions, utilities, building materials, current usage, and other planning relevant to potential future demolition and removal: additionally, inspect the building for potential presence of hazardous materials, including asbestos and lead-based paint: suspected materials will be collected and analyzed
- Measure the dimensions of roads and sidewalks and note the presence and dimensions of signs and other features and structures that might be affected by additional removal actions in the L7 and L34 areas
- Conduct a utility locate of the area of Buildings 310 and 333

Task 8—Assess Initial Logistics and Cost of Demolition and Removal of Buildings 310 and 333

Using the information obtained in Task 7, develop an initial plan and a cost estimate for demolition and removal of Buildings 310 and 333. The plan and cost estimate will be finalized as part of the remedial system design.

Task 9—Complete a Report of Investigations and Remediation Alternatives

A report summarizing the field and laboratory information, findings, conclusions, and recommendations will be prepared for BIA review. The report will include:

- Summary descriptions of the investigation activities and any deviations from the work plan
- Field and laboratory data in tabular and graphic forms
- Estimates of the extent and volumes of impacted subsurface soils and the mass of remaining petroleum hydrocarbons
- Groundwater iso-concentration and potentiometric maps and comparisons with previous data

- Updated geologic cross-section depictions
- Soil gas survey results and vapor intrusion exposure pathway conclusions
- IDW disposal notes
- Building demolition and removal plans and costs
- Updated remediation alternatives feasibility study

Task 11—Complete a Remedial Action Work Plan

Update the Remedial Work Plan, with the recommended remedy selected in the updated feasibility study. The contractor shall submit draft and hardcopies of a Remedial Action Work Plan, developed to execute the approved remedial approach for addressing hydrocarbon-impacted soil and groundwater within the community of Owyhee, Nevada.

The Remedial Implementation Work Plan shall include specifications and work requirements necessary to fully implement all aspects of the approved final Feasibility Study. The Work Plan shall include, but not be limited to, the following components:

- Bid -ready Statement of Work and Technical Specifications for one base and four optional performance periods in Request for Bid format
- Racer or equivalent Engineering Cost Estimate HASP/QAPP
- Tables, figures, and attachments

The draft Remedial Action Work Plan shall be distributed to stakeholders electronically for editing and markup. Upon receipt of the draft document, stakeholders shall have a minimum 30-calendar-day review and comment period following submittal the draft Plan. The final Remedial Action Work Plan shall be submitted within 30 days following stakeholder review. The contractor shall incorporate to the greatest extent practical, and as appropriate, any comments, concerns or recommendations provided by the stakeholders during this period into the final Plan.

The contractor shall submit by mail one hard and one electronic copy of the final Remedial Action Work Plan to BIA Division of Environmental and Cultural Resources; three hard and three electronic copies of the final Plan to the Tribe; and three hard and three electronic copies of the final Plan to EPA Region 9.

Task 12—Meetings and Site Visits

This task includes time for a site visit prior to the drilling activities and a meeting with the Tribes after the field work is completed.